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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/701,183

11/04/2003

Hylke Akkerman

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34408 7590 03/01/2007  
THE ECLIPSE GROUP  
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EXAMINER

NGUYEN, THANH T

ART UNIT

PAPER NUMBER

2813

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

03/01/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

# Office Action Summary

Application No.

10/701,183

Applicant(s)

AKKERMAN ET AL.

Examiner

Thanh T. Nguyen

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 04 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-8,10-13,19,21-24,26 and 28-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-8,10-13,19,21-24,26 and 28-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-3, 5-8, 10-13, 19, 21-24, 26 and 28-30 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 7-8, 10-11, 13, 19, 22-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Katz (U.S. Patent No. 6,403,397).

Referring to figures 1-2, Katz teaches an integrated circuit, comprising:  
a dielectric layer (14) comprising a surface, a portion of said surface having exposed aromatic groups (polyimide is aromatic polymer, see col. 3, lines 15-19), the dielectric layer being formed from a precursor composition including a member selected from the group consisting of: Naphthalenes, styrenes, phenols, benzenes, and cresol. With regard to the term “dielectric layer being formed from a precursor composition including a member selected from the group consisting of: Naphthalenes, styrenes, phenols, benzenes, and cresol” is method recitations in a

Art Unit: 2813

device claimed, and they are non-limiting, because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not. It is also noted that polyimide is formed from organic precursor”.

a polycrystalline semiconductor layer (16) comprising an organic semiconductor composition overlying and in contact with the portion of said surface, the organic semiconductor composition comprising a compound comprising a chain-like moiety, the chain-like moiety comprising a conjugated thiophene or phenyl group and comprising alkyl chains at ends of the chain-like moiety. With regard to the term “a polycrystalline semiconductor layer comprising an organic semiconductor composition comprising a compound comprising a chain-like moiety, the chain-like moiety comprising a conjugated thiophene or phenyl group and comprising alkyl chains at ends of the chain-like moiety” is method recitations in a device claimed, and they are non-limiting, because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not;

a gate electrode (12);

a source electrode (18); and

a drain electrode (20);

the source and drain electrodes being in spaced apart conductive contact with a channel

Art Unit: 2813

portion of the semiconductor layer, the gate electrode being positioned to control a conductivity of the channel portion (see figures 1-2).

Regarding to claim 2, each of said moieties comprises on average at least about three conjugated aromatic rings (see col. 4, lines 1-23).

Regarding to claim 3, the alkyl chains comprise on average between about 3 and about 12 carbon atoms (see col. 4, lines 1-23).

Regarding to claim 8, in which each of said moieties comprises on average between about three and about six conjugated aromatic rings (see col. 4, lines 1-23).

Regarding to claim 10, the channel portion has an on/off ratio of at least about 100 (see table, col. 7-8).

Regarding to claim 11, the semiconductor composition comprises a member selected from the group consisting of: 5,5'-Bis(4-n-hexylphenyl)-2,2'-bithiophene; 5,5'-Bis(4-n-hexylphenyl)-2,2':5',2"-terthiophene; 5,5'''-Bis(4-n-hexylphenyl)-2,2':5',2":5",2'''-quaterthiophene; 1,4-Bis[5-(4-n-hexylphenyl)-2-thienyl]benzene; 2,5-Bis[4(4'-hexylphenyl)phenyl]thiophene; 5,5'''-Bis(4-n-hexyl)-2,2":5',2':5",2'''-quaterthiophene; 5,5'''-Bis(4-n-hexyl)-2,2':5',2"-5" 2'''-pentathiophene; 1,4-Bis((5-n-hexyl)-2,2'-bithienyl)benzene; 2,6-bis(5-hexylthien-2-yl)naphthalene; and mixtures (see col. 4, lines 1-23).

Regarding to claim 12, the term "dielectric layer comprises poly(4-vinylphenol-co-2-hydroxyethyl methacrylate)" is method recitations in a device claimed, and they are non-limiting, because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113.

Art Unit: 2813

Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

Regarding to claim 19, polycrystalline semiconductor layer comprising an organic semiconductor composition, overlying and in contact with a portion of a surface having exposed aromatic groups (vaporizing (annealing) would form the polycrystalline film, see col. 5, lines 45-49).

Regarding to claim 22, an alkyl chain comprises, as a linkage in the chain, a member selected from the group consisting of oxygen, nitrogen or sulfur (see col. 4, lines 1-23).

Regarding to claim 23, an alkyl chain comprises a hetero substituent (see col. 4, lines 1-23).

Regarding to claim 24, a thiophene or phenyl group includes an alkyl- or hetero-substituent (see col. 4, lines 1-23).

Regarding to claim 25, each of the moieties comprises between about 3 and about 10 conjugated aromatic rings (see col. 4, lines 1-23).

Regard to claims 1-3, 8, 11, 19, 21-24, these claims contains method recitations in a device claimed, and they are non-limiting, because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5-6, 12-13, 21, 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katz (U.S. Patent No. 6,403,397) as applied to claims 1-3, 7-8, 10-11, 19, 22-24 above in view of Klauk et al., High-mobility polymer gate dielectric pentacene thin-film transistors, Journal of applied physics, November 1, 2002, pages 5259-5263, Vol. 92, Number 9 (cited by applicant), and Mushrush et al., Easily processable Phenylene-Thiophene-based organic field-effect transistors and solution-fabricated nonvolatile transistor memory elements, J. Am. Chem. Soc., 2003 pages 9414-9423, Vol. 125, Number 31 (cited by applicant).

Referring to figures 1-2, Katz teaches an integrated circuit, comprising:  
a dielectric layer (14) comprising a surface, a portion of said surface having exposed aromatic groups (polyimide is aromatic polymer, see col. 3, lines 15-19), the dielectric layer being formed from a precursor composition including a member selected from the group consisting of: Naphthalenes, styrenes, phenols, benzenes, and cresol. With regard to the term “dielectric layer being formed from a precursor composition including a member selected from the group consisting of: Naphthalenes, styrenes, phenols, benzenes, and cresol” is method recitations in a device claimed, and they are non-limiting, because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how

actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not. It is also noted that polyimide is formed from organic precursor”.

a polycrystalline semiconductor layer (16) comprising an organic semiconductor composition overlying and in contact with the portion of said surface, the organic semiconductor composition comprising a compound comprising a chain-like moiety, the chain-like moiety comprising a conjugated thiophene or phenyl group and comprising alkyl chains at ends of the chain-like moiety. With regard to the term “a polycrystalline semiconductor layer comprising an organic semiconductor composition comprising a compound comprising a chain-like moiety, the chain-like moiety comprising a conjugated thiophene or phenyl group and comprising alkyl chains at ends of the chain-like moiety” is method recitations in a device claimed, and they are non-limiting, because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not;

a gate electrode (12);

a source electrode (18); and

a drain electrode (20);

the source and drain electrodes being in spaced apart conductive contact with a channel portion of the semiconductor layer, the gate electrode being positioned to control a conductivity of the channel portion (see figures 1-2, meeting claim 29).



However, the reference does not teach dielectric layer is formed from a precursor composition of the group consisting of polyphenol, a polystyrene, a poly(phenoxyethyl methacrylate), poly(4-vinylphenol-co-2-hydroxyethyl methacrylate), the semiconductor composition comprises 5,5'-Bis(4-n-hexylphenyl)-2,2'-bithiophene and the specific crystal size, and mobility of the semiconductor layer.

Klauk et al. teaches a forming an organic thin-film transistor, wherein forming a dielectric layer by using poly(4-vinylphenol-co-2-hydroxyethyl methacrylate) (see page 5259). It is obvious that the same material would form a layer with a refractive index of at least about 1.52.

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would form a dielectric layer is formed from a precursor composition of the group consisting of naphthalenes, styrenes, phenols, and cresols of poly(4-vinylphenol-co-2-hydroxyethyl methacrylate) which has a refractive index of at least about 1.52 in process of Katz as taught by Klauk et al. because the process would form a device with large carrier mobility, low threshold voltage, low subthreshold swing, and large on/off current ratio (see page 5262).

Mushrush et al teach forming an organic field effect transistors wherein forming an organic semiconductor layer by using 5,5'-Bis(4-n-hexylphenyl)-2,2'-bithiophene (see abstract, page 9414 and 9416).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would form an organic semiconductor layer by using 5,5'-Bis(4-n-hexylphenyl)-2,2'-bithiophene in process of Katz as taught by Mushrush et al. because

Art Unit: 2813

the material would provide a transistor with high carrier mobility, low leakage current, straightforward synthesis, facile film deposition, and chemical stability.

It would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made to optimize the crystal size, and mobility of the semiconductor layer, since it has been held that where the general conditions of a claim are disclosed in the prior art (i.e.- semiconductor crystal size of at least about 0.1 micrometer, polycrystalline semiconductor layer has a mobility of at least about 0.1 centimeters squared per volt-second), discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233 (CCPA 1955).

The specification contains no disclosure of either the critical nature of the claimed arrangement (i.e.- semiconductor crystal size of at least about 0.1 micrometer, polycrystalline semiconductor layer has a mobility of at least about 0.1 centimeters squared per volt-second) or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen limitations or upon another variable recited in a claim, the applicant must show that the chosen limitations are critical. In re Woodruff, 919 F.2d 1575, 1578 (FED. Cir. 1990).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would forming the semiconductor layer with semiconductor crystal size of at least about 0.1 micrometer and a mobility of at least about 0.1 centimeters squared per volt-second in process of Katz in order to optimize the process.

Claims 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katz (U.S. Patent No. 6,403,397) as applied to claims 1-3, 7-8, 10-13, 19, 21-24, 28-30 above in view of Katz et al., Synthesis, Solubility, and Field-Effect Mobility of Elongated and Oxa-Substituted a, w-Dialkyl Thiophene Oligomers, Extension of "Polar Intermediate" Synthetic Strategy and Solution Deposition on Transistor Substrates, Chem. Mater., 1998, Page(s) 633-638, Volume 10, number 2 (cited by applicant).

Katz teaches forming a dielectric layer and forming a polycrystalline semiconductor on the dielectric layer. However, the reference does not teach dielectric layer has at least the polarizability of chlorobenzene.

Katz et al. teaches dielectric layer has at least the polarizability of chlorobenzene (see page 637).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would form dielectric layer has at least the polarizability of chlorobenzene in process of Katz as taught by Katz et al. because the material would provide a transistor with high carrier mobility, and chemical stability.

### ***Response to Arguments***

Applicant's arguments filed 7/10/06 have been fully considered but they are not persuasive.

Applicant contends that Katz does not teach the dielectric layer being formed from a precursor composition including a member selected from the group consisting of: Naphthalenes, styrenes,

Art Unit: 2813

phenols, benzenes, and cresol. With regard to the term “dielectric layer being formed from a precursor composition including a member selected from the group consisting of: Naphthalenes, styrenes, phenols, benzenes, and cresol” is method recitations in a device claimed, and they are non-limiting, because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not. It is also noted that polyimide is formed from organic precursor”. Eventhough applicant contends that these limitations have some effect on the final product. However, there is no evidence that the prior art would not provide the same product.

The arguments of counsel cannot take the place of evidence in the record. In re Schulze, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965); In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997) (“An assertion of what seems to follow from common experience is just attorney argument and not the kind of actual evidence that is required to rebut a prima facie case of obviousness.”). See MPEP 716.01(c) for examples of attorney statements which are not evidence and which must be supported by an appropriate affidavit or declaration.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Nguyen whose telephone number is (571) 272-1695, or by Email via address Thanh.Nguyen@uspto.gov. The examiner can normally be reached on Monday-Thursday from 6:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached on (571) 272-1702. The fax phone number for this Group is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://paired.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Thanh', is located at the bottom right of the page.

Art Unit: 2813

Thanh Nguyen  
Patent Examiner  
Patent Examining Group 2800

TTN